

MISSILES ***OF THE WORLD***



Michael J. H. Taylor

\$14.95

Missiles of the World (Third Edition)

MICHAEL J. H. TAYLOR

Since its first publication in 1972, *Missiles of the World* has taken its place alongside its companion volumes *Military Aircraft of the World* and *Civil Aircraft of the World* as an established standard compact reference work. But many changes have taken place since then. Old, familiar names have disappeared from inventories, and the greatest advances in operational deployment have, as might be expected, come from the Soviet Union. The capability and throw weight of the latest Soviet strategic missiles is such that, according to the U.S. Department of Defense, the currently deployed U.S. Minutemen sites are extremely vulnerable to "first strike" destruction. Hence the SALT talks.

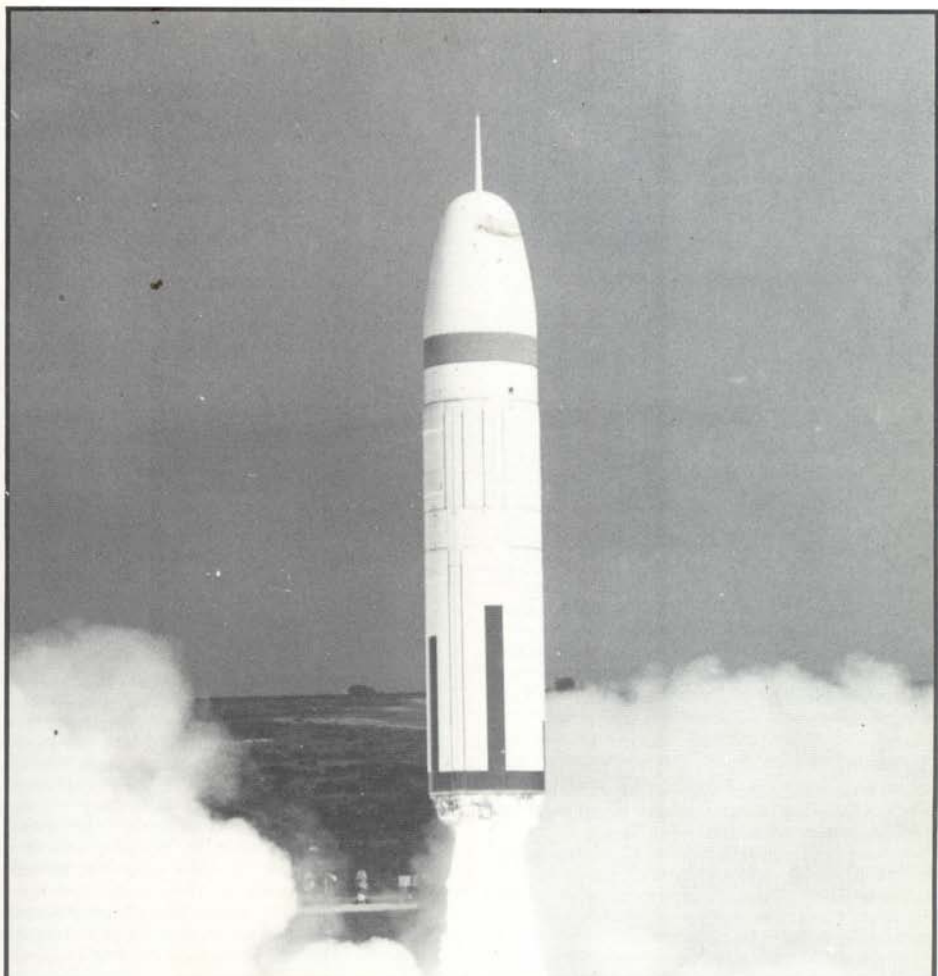
This third edition provides the hard facts behind the negotiations of the SALT II agreement. Many new photographs and considerable updating make this book an ideal reference for anyone interested in missile development and deployment.

Cover: Ground launch of a Tomahawk cruise missile.

APRIL 1984

299

From the
library of
Daniel F. Elliott



MISSILES *OF THE WORLD*

MICHAEL J. H. TAYLOR

Charles Scribner's Sons
NEW YORK

Note

The quotation marks around a number of Soviet missiles, aircraft, naval units and arms indicate that the given name is a NATO reporting name. When they appear without quotation marks, they indicate the true Soviet class or type nomenclature which they have retained even if serving under another country's flag.

Addenda

A NATO reporting name has been issued for the AT-5 as 'Spandrel'. A man-portable tripod-mounted derivative of the AT-5 is the AT-4 'Spigot'. A 'fire-and-forget' anti-tank missile (AT-6), developed for the Mil Mi-24 'Hind' helicopter, is known to NATO as 'Spiral'. This is thought to home on targets illuminated by a laser designator and to have a range of up to 6.2 miles (10km).

It is now known that the Soviet designations of the SS-17, SS-18, SS-19 and SS-N-8 are the RS-16, RS-20, RS-18 and RSM-50 respectively.

Foreword

The first edition of this book was launched into completely unexplored skies. Companion to *Helicopters of the World*, *Military Aircraft of the World* and *Civil Aircraft of the World*, *Missiles of the World* found a ready market. Engineers, members of the armed services, the press and broadcasting, government agencies, and thousands of others had clearly been waiting for a book that would give accurate, up-to-date information on every guided missile known to be in service or under development throughout the world. When the Strategic Arms Limitation Talks between America and Russia brought the first agreement (SALT I) to reduce the crippling cost of an arms race with weapons of ultimate destruction, this focused attention on the subject of the book.

Much more has been learned about Soviet missiles since 1972 and, indeed, since the second edition of the book appeared in 1978. The precise number of intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs) deployed by the two super powers became common knowledge after the signature of the SALT I agreement. Information on new developments has been made available more freely, now that continuous surveillance by satellite is accepted as a guarantee of good faith by both sides. As a result, it has been possible to pack a truly astonishing amount of new material into this third edition of *Missiles of the World*, requiring a more extensive revision than is customary for even its 'Aircraft' companions.

All information is presented in a way that can be understood easily by non-technical readers. This task has been assisted by correspondents, manufacturers and official organisations in more than a dozen countries. To them all is expressed our sincere gratitude, for these terrifying weapons can serve their purpose only if their potential is fully understood. Our world will remain safe from major war only so long as the leaders of both East and West are left in no doubt of what would be the consequences of any act of major aggression.

Foreword to the Third Edition

Many changes have taken place since the second edition went to press. Old and familiar names have disappeared from inventories — Falcon AIM-26, Frog-1 and 2, Hound Dog, Nike Ajax, 'Saddler', 'Sark', 'Sasin', 'Scrubber', 'Scud-A', Sea Killer Mk 1, Sergeant and Thunderbird — while the greatest advances in operational deployment of new missiles has, as might be expected, come from the Soviet Union. Such is the capability and throw weight of the latest Soviet strategic missiles that, according to the US Department of Defense, the currently deployed US Minuteman sites are extremely vulnerable to 'first strike' destruction. Meanwhile a SALT II agreement, which would be in force until the end of 1985, has still to be ratified.

M.J.H.T.

AAM-1

Air-to-air missile. In service.

Prime contractor: Mitsubishi Heavy Industries Ltd
Guidance and Control: Infra-red homing guidance system

Warhead: High-explosive

Development and Service

Mitsubishi Heavy Industries developed this air-to-air

Japan

missile specifically to replace the Sidewinder on F-86F and F-104J interceptors of the Japan Air Self-Defence Force (JASDF). Deliveries began in 1970 and the planned production of 330 missiles was completed by late 1971. No details of the AAM-1 have been released for publication, except that it is a pursuit-course weapon, limited to attack from the rear of the target.

AAM-2

Air-to-air missile.

Development and Service

The AAM-2 was being developed by Mitsubishi as a replacement for the AAM-1. It has been reported that the project has now been abandoned.

Japan

Acrid (AA-6)

Air-to-air missile. In service.

Airframe: Cylindrical body with ogival nose cone. Large cruciform wings, indexed in line with cruciform foreplanes

Guidance and Control: Alternative infra-red and semi-active radar homing guidance systems

Warhead: High-explosive

Length: Radar-homing approx 20ft 0in (6.10m)

Range: at least 23 miles (37km)

Development and Service

Largest Soviet air-to-air missile yet identified in service, 'Acrid' is carried by the Mach 3 MiG-25

USSR

interceptor ('Foxbat-A'). Deployment on this aircraft can comprise one IR and one radar guided missile under each wing. The 'Foxbat-A' wingtip fairings are believed to house continuous wave target illuminating equipment, used in association with radar-homing 'Acrid' missiles.

Below: 'Acrid' missiles under the wings of MiG-25 'Foxbat' interceptors.



Advanced Terrier (RIM-2F)

Ship-based surface-to-air missile. In service.

Prime contractor: General Dynamics Corporation
Powered by: Allegany Ballistics Laboratory tandem two-stage solid-propellant rocket motors

Airframe: Tandem two-stage design. Cylindrical missile body, with long ogival nose; cruciform long-chord wings of constant narrow span with cruciform tail control surfaces immediately to their rear. Cylindrical tandem booster of larger diameter, with cruciform cropped-delta fins at rear, indexed in line with missile surfaces

Guidance and Control: General Dynamics (Pomona) beam-riding guidance with semi-active terminal homing. Control by movable tail surfaces

Warhead: Naval Ordnance Laboratory high-explosive warhead, with proximity fuse

Length: 27ft 0in (8.23m)

Body diameter: Missile 1ft 1.5in (0.34m)
Booster 1ft 4in (0.406m)

Wing span: 1ft 8in (0.51m)

Launch weight: 3,000lb (1,360kg)

Max speed: Mach 2.5

Max range: approx 22 miles (35km)

Effective ceiling: 12.4 miles (20km)

Development and Service

The original Terrier missile (RIM-2A, formerly SAM-N-7) was evolved from an experimental vehicle named Lark and became operational on ships of the US Navy in 1956. It was followed seven years later by Advanced Terrier, with new beam-riding guidance which offered greatly increased effectiveness against low-flying aircraft and multiple targets, and also gave the missile a surface-to-surface capability. Externally, the Advanced weapon differs from Terrier mainly in

having strake-like wings instead of the former small cropped-delta surfaces.

Advanced Terrier continues to arm several US attack carriers and cruisers as well as three Italian cruisers, but has been widely superseded by Standard Missile.



USA

Aegis

Surface-to-air ship-based weapon system. Under development.

Prime contractor: Radio Corporation of America

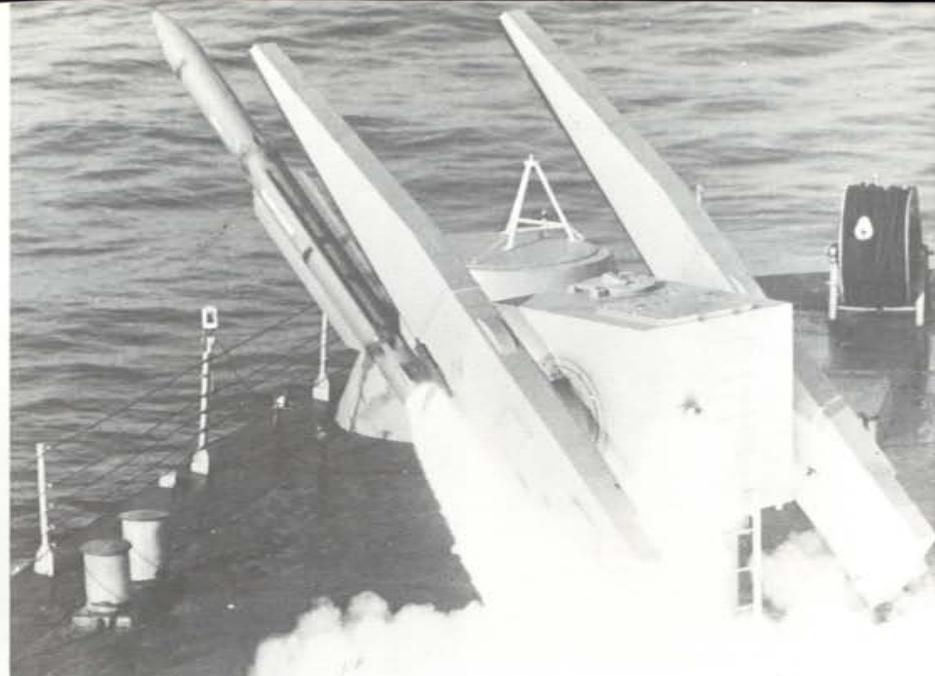
Development and Service

Aegis was known originally as the Advanced Surface Missile System (ASMS) and is expected to be the US Navy's primary defensive missile system in the 1980s. It is designed primarily for defence against anti-ship missiles, and is planned as an area-defence system, able to protect an entire task force. Initial deployment is expected to be on board a new class of strike cruisers and guided missile destroyers. System features include the AN/SPY-1 multi-function phased array radar which is capable of surveillance and the simultaneous detection and tracking of multiple targets, Mk 26 dual-purpose launcher able to launch Asroc and Harpoon missiles as well as the SM-2 missiles for Aegis, the AN/UYK-7 digital computer, Mk 99 fire control

system to illuminate and if necessary track the target, Mk 12 weapon direction system, Mk 130 command and control system, and Mk 545 operational readiness test system (ORTS).

Initial planning for Aegis started in 1964. An engineering development contract was awarded to RCA in December 1969, and land-based testing was completed successfully in 1973. The system was installed on the test ship USS Norton Sound, which began sea trials in early 1974, and successfully demonstrated its operational capabilities. Thirty-three Aegis firings had been made by March 1977, including the first with an SM-2 missile in December 1976. Evaluation and demonstration of Aegis continued in 1979. The first new ship to be Aegis-armed is expected to be the guided missile destroyer DDG-47 to be commissioned in 1982.

USA



Albatros

Surface-to-air missile system. In production and service.

Prime contractor: Selenia Industrie Eletttroniche Associate SpA

Wing span of missile: 2ft 7.5in (0.80m)

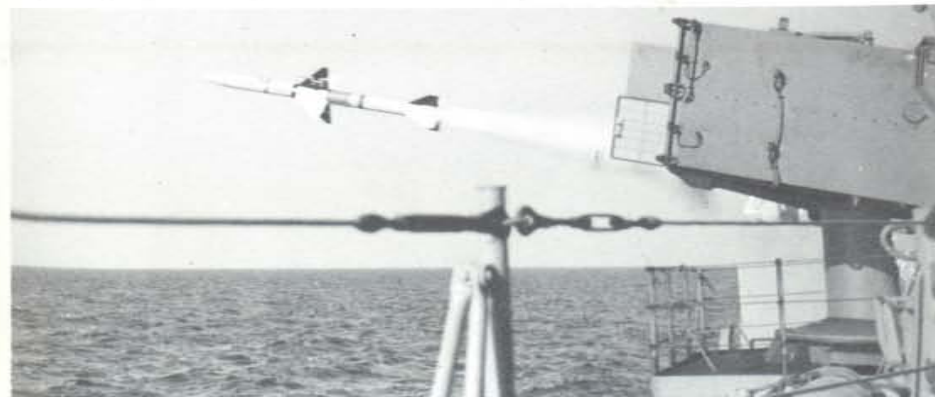
Development and Service

The Albatros weapon system is intended to provide naval craft with all-weather point defence against attack by aircraft and missiles, down to very low altitudes. It consists of either a Ferranti WSA-400 digital gun fire control system or Eltag NA-10 gun fire control system, Selenia Orion RTN 10X tracking pulse radar, a missile launching system and anti-aircraft guns, and Aspide missiles (with shorter span wings and tail surfaces than the air-to-air version). Only a single operator is required for the Albatros

system, to carry out radar control functions, missile launch and gun fire control. Defensive cover is provided from the maximum range of the missiles down to the minimum effective range of the guns (about 1,000ft, 300m).

Selenia received an official contract to begin development of the Albatros system in early 1968. Successful firing trials against target drones in Sardinia were followed by operational evaluation on board a ship of the Italian Navy in 1973. However the original Albatros system using RIM-7H Sparrow missiles was subsequently abandoned. The current system with Aspide missiles is known as Albatros Mk 2. A lightweight Albatros system has also been developed for small naval vessels, with four-round instead of eight-round launchers. Albatros is now in production for the Italian Navy and a number of foreign navies, including those of Greece, Peru and Venezuela.

Italy



ALCM (AGM-86B)

Air-launched cruise missile. Under development.

Prime contractor: Boeing Aerospace Company
Powered by: Williams Research Corporation F107-WR-100 turbofan engine in the 600lb (272kg) thrust class
Guidance and Control: Inertial guidance system, plus terrain contour matching (TERCOM)
Warhead: Nuclear
Length: 20ft 9in (6.32m)
Body diameter: 2ft 1.5in (0.65m)
Wing span: 12ft 0in (3.66m)
Launch weight: 2,825lb (1,282kg)
Range: over 1,500 miles (2,400km)

Development and Service

The original short-range AGM-86A version of the ALCM was evolved from SCAD (Subsonic Cruise Armed Decoy), a projected replacement for Quail which was cancelled in 1973. It retained the same basic airframe, with folding wings and tail so that it could be carried on the SRAM rotary launcher. When carried externally, it could be fitted with an underbelly fuel tank to increase its range. However, development is currently centred on a larger version of the ALCM, designated AGM-86B, which has a much greater range. The B-52 will still carry 20 missiles. It is reported that 95% of the components for the AGM-86B are similar to those of AGM-86A, including the engine, guidance and navigation systems.

Before launch, a predetermined target is programmed into each missile. During the terrain contour matching mode of flight, a computer in the missile keeps it on course by matching the geography seen by its sensors with a pre-programmed map storage device. Any error between where the missile is and where the map says it should be is then computed and the missile steers back on course and towards the next predetermined map area. Many ALCMs attacking at once are intended to confuse and spread out the effectiveness



of defending forces, and so improve the chances of manned bombers to penetrate major targets.

Flight testing of the initial batch of AGM-86A ALCM development missiles began on 5 March 1976. During 1979 10 AGM-86Bs were flight tested against the air-launched version of the Tomahawk, and a production decision is expected in 1980, with initial deployment in the early 1980s. The ALCM is also being considered for deployment in Europe in non-nuclear, decoy and reconnaissance roles.

Below: AGM-86A ALCM launched from a B-52 on its first powered flight, 5 March 1976



USA

Alkali (AA-1)

Air-to-air missile. In service.

Powered by: Solid-propellant rocket motor
Airframe: Basically cylindrical body, with large rear-mounted cruciform wings of delta shape, indexed in line with small cruciform foreplanes. Control surfaces in wing trailing-edges
Guidance and Control: Semi-active radar homing system. Control via wing trailing-edge surfaces
Length: 6ft 2in (1.88m)
Body diameter: 7in (0.178m)
Wing span: 1ft 10.75in (0.58m)
Launch weight: approx 200lb (90kg)
Range: 3.7-5 miles (6-8km)

Development and Service

'Alkali' continues to be carried by all-weather interceptor versions of the MiG-19, in service with some of Russia's allies and friends. It was the first-generation missile armament of this fighter and of the Sukhoi Su-9.



USSR

AMRAAM

Advanced medium-range air-to-air missile. At initial design stage.

Development and Service

The AMRAAM has been initiated as a US Tri-Service programme to assess the possible air-to-air threat into the 21st century and begin definition of a missile capable of dealing with it. Five US manufacturers are engaged in separate projects. The missile is to be an all-weather weapon with snap-

down capability, have resistance to electronic countermeasures to a degree equal if not better than present monopulse techniques, have all aspect launch/tracking ability and good range. Launch weight is to be kept below 350lb (160kg). When operational, the missile will arm Grumman F-14 Tomcat, McDonnell Douglas F-15 Eagle, General Dynamics F-16 and McDonnell Douglas F-18 Hornet fighters.

USA

Anab (AA-3)

USSR



'Anab' under the wings of a Yak-28P 'Firebar'

Air-to-air missile. In service.

Airframe: Cylindrical body, fitted with large cruciform tail-fins and small cruciform foreplanes
Guidance and Control: Alternative infra-red and semi-active radar homing guidance systems. Control by movable foreplanes
Warhead: High-explosive
Length: IR version 13ft 5in (4.1m)
Radar homing version 13ft 1in (4.0m)
Body diameter: 11in (0.28m)
Wing span: 4ft 3in (1.30m)
Range: over 10 miles (16km)

Development and Service

Like the USAF, the Soviet Air Force learned by experience the value of carrying both infra-red

homing and radar homing missiles on its interceptors, for use under varying weather conditions and in different tactical situations. The Sukhoi Su-11 'Fishpot-C' and Yakovlev Yak-28P 'Firebar' all-weather fighters of the Protivo-Vozdushniya Oborona Strany (National Anti-Air Defence force) are thus armed usually with one 'Anab' of each type on underwing racks, although the Yak-28P is being phased out of service. 'Anabs' are also carried by the single-seat twin-jet Sukhoi Su-15 'Flagon'.

Apex (AA-7)

Air-to-air missile. In production and service.

Powered by: Solid-propellant rocket motor
Airframe: Cylindrical body with mid-positioned cruciform delta wings, indexed in line with cruciform tail fins and foreplanes
Guidance and Control: Alternative infra-red and semi-active radar homing guidance systems
Length: 14ft 1.25in (4.30m)

Aphid (AA-8)

Air-to-air missile. In production and service.

Powered by: Solid-propellant rocket motor
Airframe: Cylindrical body fitted with large rear-mounted cruciform wings of cropped delta shape, indexed in line with small cruciform foreplanes
Guidance and Control: Infra-red homing guidance. Control probably by foreplanes
Warhead: 13.2lb (6kg) weight

Argentine air-to-surface missile

Prime contractor: Armed Forces Scientific and Technical Research Centre
Guidance: Radio command
Warhead: 88lb (40kg) weight
Launch weight: 254lb (115kg)
Max range: 4.35 miles (7km)

Development and Service

The Centre has designed and built an air-to-surface missile for possible future deployment on fixed- and

USSR

Body diameter: 9.5in (0.24m)
Wing span: 3ft 5.5in (1.05m)
Launch weight: 705lb (320kg)
Range: 17 miles (27km)

Development and Service

This new missile is one of the weapons carried by MiG-23 'Flogger' interceptors of the Soviet Air Force and has been named as an alternative missile for the MiG-25 'Foxbat'.

USSR

Length: 6ft 6.75in (2.00m)
Body diameter: 5in (0.13m)
Launch weight: 121lb (55kg)
Range: 3.5-5 miles (5.5-8km)

Development and Service

Nothing more is known of this 'dogfight' missile, which can be carried by MiG-23 'Flogger' interceptors.

Argentina

rotary-wing aircraft of the Argentine Navy. The eight research and development missiles are being followed by a pre-production batch of 50 missiles.

Argentine anti-tank missile

An Argentinian anti-tank missile, in the same class as Cobra, is thought to have become operational in 1979.

AS-8

Air-to-surface missile. In service.

Range: 5 miles (8km)

Development and Service

The AS-8 is a new Soviet helicopter-launched 'fire-and-forget' missile, developed for attacking

AS.11 (AGM-22A)

Air-to-surface tactical missile. In production and service.

Prime contractor: Aérospatiale, Division Engins
Tactiques

Powered by: Two-stage solid-propellant rocket motor

Airframe: Cylindrical body, with cruciform sweptback wings and rounded nose

Guidance and Control: Wire guidance. Control by varying sustainer thrust through two side-nozzles

Warhead: High-explosive, high-fragmentation anti-personnel or armour-piercing, of several types
Length: 3ft 11in (1.20m)

Body diameter: 6.5in (0.16m)

Wing span: 1ft 7.5in (0.50m)

Launch weight: 66lb (29.9kg)

Average cruising speed: 360mph (580km/h)

Range limits: 1,150-9,840ft (350-3,000m)

Development and Service

This is the air-to-surface version of the SS.11 tactical missile, to which it is generally similar. When carried by helicopters, it is normally controlled by means of a specially-developed stabilised and magnifying sight. After launch, the missile is aligned with the target by the operator, using a control stick. Tracer flares at the rear of the missile help to give visual reference. The AS.11 B.1 version has been in production since 1962 and is in service with the French armed forces and those of 27 other countries (incl SS.11), including the UK and USA, by which it is designated AGM-22A. Production of AS/SS.11 totalled 168,340 by January 1979, including Harpons. Licence manufacture has been undertaken in West Germany and India.

Below: AS.11 fired from an Alouette III helicopter.



Argentina

USSR

armoured vehicles and suppression of air defence sites. It has been supplied to Mil Mi-24 'Hind-A and D' units, and it will also arm the light attack helicopter currently under development in the Soviet Union.

France



Above: AS.11s on a British Army Scout helicopter.

AS.12

Air-to-surface missile. In production and service.

Prime contractor: Nord-Aviation/Aérospatiale, Division Engins Tactiques

Powered by: Two-stage solid-propellant rocket motor

Airframe: Cylindrical body, with cruciform wings and bulged ogival nose

Guidance and Control: Wire-guidance, under manual control. The missile is spin-stabilised and steered by varying the sustainer thrust through two side-nozzles

Warhead: High-explosive, weighing 62.6lb (28.4kg)

Length: 6ft 1.9in (1.87m)

Body diameter: 7in (0.18m)

Wing span: 2ft 1.5in (0.65m)

Launch weight: 170lb (77kg)

Speed at impact: 210mph (335km/h) when launched at 230mph (370km/h)

Max range: 19,685ft (6,000m)

Below: AS.12.

Top right: AS.12s on an Alouette III helicopter.

France



Development and Service

By scaling up the basic SS.11 and AS.11 to produce the SS.12 and AS.12, Nord-Aviation was able to fit a much larger warhead and so create a missile that would be effective against fortified positions as well as tanks, ships and other vehicles. The armour-piercing version will penetrate more than 1.5in (40mm) of steel armour and explode on the other side. Alternatives include an anti-tank shaped charge

and a pre-fragmented anti-personnel type. All AS.12s are steered manually. They are carried by Alizé, Atlantic, Neptune and Nimrod anti-submarine aircraft and, in conjunction with an optical stabilised sight, by Alouette, Lynx and Wessex helicopters of the French Navy, Royal Navy and other naval air arms. Orders totalled 8,287 missiles (and SS.12s) by January 1979.

AS.15 and AS.15TT

France



Air-to-surface missile. Under development.

Data: AS.15TT

Prime contractor: Aérospatiale, Division Engins Tactiques

Airframe: Cylindrical body with ogival nose.

Cruciform mid-positioned wings, indexed in line with tail fins

Guidance and Control: Radar tracking. Radio altimeter. Control via tail fins

Warhead: As for AS.12

Length: 7ft 1in (2.16m)

Body diameter: 7.25in (0.185m)

Wing span: 1ft 9in (0.53m)

Launch weight: 211lb (96kg)

Cruising speed: 626mph (1,008km/h)

Range: over 9.3 miles (15km)

Above: Artist's impression of an AS.15TT attack from an SA365 Dauphin II helicopter.

Development and Service

The AS.15 fair weather missile and the all-weather AS.15TT (Tous Temps) are being projected as possible replacements for the AS.12. It is planned to use them from helicopters and maritime patrol aircraft, as well as from shore bases or surface ships, against vessels of all tonnages. The former uses radio command guidance with optical/infrared tracking, while a radar tracking method is used with the AS.15TT in conjunction with the Agrion 15 radar in the launch aircraft for automatic tracking of the target and differential target to missile range and

bearing measurement. The Agrion 15 performs well against small vessels in all weather conditions and in the presence of ECM. In operation, the target is detected and identified. The radar is then switched to automatic tracking and the AS.15TT is launched. The missile is thereafter guided automatically and descends to a sea-skimming altitude. Impact cruising altitude is approximately 16-20ft (5-6m). Hit probability is claimed to be near 100%, even at maximum range. The missile can also be launched from very low flying aircraft.

AS.20

Development and Service

The AS.20 air-to-surface missile is being withdrawn from service. (See Second Edition of *Missiles of the World*.)

Below: AS.20 on an F-104G Starfighter of Marinefliegergeschwader 1, German Navy.



France

AS.30

Tactical air-to-surface missile. In service.

Prime contractor: Nord-Aviation/Aérospatiale, Division Engins Tactiques

Powered by: Two-stage solid-propellant rocket motor

Airframe: Cylindrical body with pointed ogival nose.

Canted cruciform sweptback wings, indexed in line with cruciform flip-out tail-fins

Guidance and Control: Radio command, with optional TCA automatic guidance

Warhead: High-explosive, weighing 510lb (230kg), with delay or non-delay fuse, or semi armour-piercing

Length: 12ft 7in (3.84m) or 12ft 9in (3.89m) depending on warhead

France

Body diameter: 1ft 1.5in (0.34m)

Wing span: 3ft 3.5in (1.00m)

Launch weight: 1,146lb (520kg)

Speed at impact: 1,005-1,120mph (1,620-1,800km/h)

Average range: 6.8-7.5 miles (11-12km)

Development and Service

Scaled up from the AS.20, with added flip-out tail-fins, this formidable missile is used by the French Air Force and Navy, the RAF, and the Air Forces of Germany, South Africa and Switzerland. It was designed to guarantee impact within a 33ft (10m) circle drawn around the aiming point when launched more than 6 miles (10km) from the target, without any need for the launch aircraft to approach within 1.8 miles (3km) of the target. This specification was exceeded by the production missiles, of which 3,855 have been delivered. Production has now ended. They can be launched at any speed above Mach 0.45, with no upper limit.

Many of the AS.30s in service with the French Air



AS.30 Laser

Tactical air-to-surface missile. Under development.

Prime contractor: Aérospatiale, Division Engins Tactiques

Airframe: Similar to AS.30 but with hemispherical glass nose. Wings canted for spin stabilisation

Guidance and Control: Two-stage guidance; gyro reference followed by laser terminal homing

Force have been adapted to utilise TCA (Téléc-commande Automatique) guidance, which frees the operator of having to 'acquire' the missile after launch and align it manually on the target by means of a small joystick control. Instead, the operator simply keeps an optical sight aligned on target. After launch, infra-red radiation from a flare on the missile is picked up by a goniometer, the reference axis of which is parallel to the axis of the optical sight. The goniometer passes to a computer information on any deviation of the missile from this axis; corrections are then passed to the missile automatically by command signals, to bring it parallel to the line of sight and keep it there. Tests have shown that TCA can keep a missile within less than 3ft 3.5in (1.0m) of the direct line to the target.

Aérospatiale and Thomson-CSF (for homing head) have developed jointly a laser-guided version of the AS.30 as armament for Jaguar aircraft, which is described separately.

France

Warhead: High-explosive, weighing 529lb (240kg)

Length: 12ft 0in (3.65m)

Body diameter: 1ft 1.5in (0.342m)

Wing span: 3ft 3.5in (1.00m)

Launch weight: 1,146lb (520kg)

Range: 6.2-7.5 miles (10-12km)

Development and Service

The AS.30 Laser has been developed to supersede the AS.30 (qv). It is similar to the earlier missile in



configuration and weight, but has laser terminal homing using the Thomson-CSF Ariel homing head. The Thomson-CSF Atlis target illuminating pod is used in association with the missile, and was first tested under a Jaguar A in 1977. Initial test firings of AS.30 Laser missiles were expected to begin in the latter part of 1978. First production deliveries are expected in late 1981.

Above: AS.30 Laser under the wing of a SEPECAT Jaguar.

ASALM

Advanced strategic air-launched missile. At design stage.

Contractors: McDonnell Douglas and Martin Marietta

Powered by: Integral rocket-ramjet, for which Marquardt and CSD have development contracts

Development and Service

Projected as a replacement for SRAM and complement the ALCM subsonic cruise missile in the 1980s, ASALM (advanced strategic air-launched missile) will be the first USAF weapon to utilise integral rocket-ramjet propulsion. In operation, a solid-propellant rocket booster, packaged in the

missile's combustion chamber, will power ASALM to a high supersonic speed. Air inlets will then open to allow outside air to be 'rammed' into the combustion chamber, where it will be mixed with liquid fuel and ignited to provide cruise thrust. Design and ground testing of such propulsion systems are being carried out by the Marquardt Company and Chemical Systems Division of UTC. Contracts for ASALM concept studies and advanced technology development have been awarded to McDonnell Douglas and Martin Marietta. The missile has to be compatible with the SRAM rotary launcher, and be capable of both high-level and low-level penetration of enemy airspace at a somewhat higher speed than SRAM. ASALM will be capable of both air-to-air and air-to-ground missions.

USA

Ash (AA-5)

Air-to-air missile. In service.

Airframe: Basically cylindrical body. Large cruciform delta wings indexed in line with cruciform tail surfaces

Guidance and Control: Alternative infra-red and semi-active radar homing guidance systems

Warhead: High-explosive

Length: IR version 18ft 0in (5.5m)

Radar-homing version 17ft 0in (5.2m)

Range: 18.5 miles (30km)

Development and Service

'Ash' is normally carried as a 'mix' of infra-red and radar homing versions by all-weather fighters of the Soviet Air Force. The big Tupolev Tu-28P twin-jet



interceptor has underwing attachments for two missiles of each type. Several thousand 'Ash' missiles were built.

USSR

ASM-1

Air-to-surface missile. In production.

Prime contractor: Mitsubishi Heavy Industries Ltd
Guidance and Control: Inertial system for mid-course guidance; active radar seeker for terminal guidance

Warhead: 440lb (200kg) weight

Length: 13ft 1.9in (4.00m)

Body diameter: 1ft 1.75in (0.35m)

Wing span: 3ft 11.25in (1.20m)

Launch weight: 1,345lb (610kg)

Cruising speed: Mach 0.9

Range: 50-56 miles (80-90km)

Development and Service

Mitsubishi Heavy Industries was selected in November 1973 as prime contractor for the development of a new air-to-surface rocket-powered anti-shiping missile to be carried by the Mitsubishi F1 aircraft. This missile is also capable of being ground or ship launched with the aid of a rocket booster. It has been designed to fly to its target at low altitude, using a TRT/Japan Radio ANV-7 radio altimeter for mid-course guidance.

Twenty-five prototype ASM-1s have been



delivered, and two were launched from a Mitsubishi T-2 in December 1977 at a height of 2,500ft (760m). Production ASM-1s are expected to be delivered to the JASDF in 1979.

Japan

ASMP

Air-to-surface missile. Under development.

Prime contractor: Aérospatiale, Division Engins
Tactiques

Powered by: Liquid-propellant ramjet

Guidance and Control: Inertial guidance. Control via tail fins and rudders

Warhead: Nuclear, approx 100-150 kiloton yield

Range: approx up to 62 miles (100km)

Development and Service

Following cancellation of development of the original ASMP missile, a new design and development contract for the Air-Sol Moyenne Portée was awarded to Aérospatiale in March 1978, announced officially on 6 April of that year. It will be a tactical missile, with possibly limited strategic capability, and will carry the French Air Force's latest tactical nuclear warhead. It is expected to enter service by 1985, although original estimates were for 1983, to arm the Dassault Mirage 2000.

France



Aspide

Air-to-air and surface-to-air missile. In production.

Prime contractor: Selenia Industrie Eletttroniche Associate, SpA

Powered by: SNIA Viscosa solid-propellant rocket motor

Airframe: Cylindrical body with pointed ogival nose. Mid-set pivoted cruciform wings indexed in line with cruciform tail surfaces

Guidance and Control: Semi-active radar homing by Selenia. Monopulse receiving system designed for effectiveness at very low altitude and against multiple targets

Warhead: Fragmentation type; estimated weight 73lb (33kg)

Length: 12ft 1.5in (3.70m)

Body diameter: 8in (0.203m)

Wing span: 3ft 3.25in (1.00m)

Launch weight: 485lb (220kg)

Cruising speed: Mach 4

Range: 31-62 miles (50-100km)

Development and Service

Designed for all weather air-to-air and surface-to-air operations, Aspides will be carried by the F-104S interceptor and its successors, and will be employed in the Albatros naval point defence weapon system and Spada low-altitude air defence system. In the air-to-air role Aspide can operate successfully from very high to very low altitude and can be installed in any modern high-performance interceptor. It offers multiple target engagement capability and resistance to advanced ECM.

The flight test programme of the Aspide missile began with a captive flight on an F-104S on 24 July 1974, at the Italian Air Force's experimental base at Pratica di Mare. The first ground-to-air firing, from a Spada launcher, followed in May 1975. In 1977 the final test phase was initiated, using 15 missiles, and production was expected to begin the same year.

Below: Aspide



Italy

Asroc (RUR-5A)

Anti-submarine rocket. In service.

Prime contractor: Honeywell Inc

Powered by: Naval Propellant Plant solid-propellant rocket motor

Airframe: Cylindrical aluminium body, made in two halves and joining torpedo at front to motor at rear. Cruciform tail-fins

Guidance and Control: Missile follows unguided ballistic trajectory after launch, towards target position predicted by shipboard sonar.

Warhead: Alternative warheads include the General

Electric Mk 44 Model 0 high-speed acoustic-homing torpedo, Aerojet-General Mk 46 Model 0 advanced acoustic-homing torpedo, Honeywell Mk 46

Model 1, or a nuclear depth charge developed by the Naval Weapons Center and Honeywell

Length: 15ft 0in (4.57m)

Body diameter: 1ft 0.75in (0.325m)

Fin span: 2ft 9.25in (0.845m)

Launch weight: 959lb (435kg)

Range: 1.25-6.2 miles (2-10km)

USA



Above: Asroc on a modified Terrier twin-launcher.

Above right: Asroc launcher on board USS Sampson.

Development and Service

Asroc development began in June 1956, and production was started three years later after successful firing trials. The weapon has been operational on destroyers, escort ships and cruisers of the US Navy since the summer of 1961 and also arms ships of Brazil, Canada, West Germany, Greece, Italy, Spain, Taiwan, Turkey and Japan.

In action, the target submarine's course, range

AS-X-9

Air-to-surface anti-radiation missile. Under development.

Range: estimated 50-56 miles (80-90km)

AS-X-10 and AS-X-11?

Development and Service

The AS-X-10 is reported to be an air-to-surface electro-optical homing missile, with a range of approximately 6.2 miles (10km). Another air-to-surface missile is under development in the Soviet Union, and has been referred to unofficially as the AS-X-11. In the USA it is officially referred to as the Advanced TASM tactical air-to-surface missile, and may have a range of about 25 miles (40km).



and speed are worked out by shipboard computer within seconds of its detection by sonar. The eight-round standard launcher, or two-round modified Terrier missile launcher is aligned into firing position. The ship's commander then selects the missile with the most appropriate warhead and fires it. En route to the target, the Asroc sheds its rocket motor at a predetermined signal. Later, a steel band holding the airframe together is severed by a small explosive charge. The airframe then falls away, allowing the depth charge to drop into the water or the torpedo to be lowered to the surface by parachute, the homing head being activated on submersion.

USSR

Development and Service

This anti-radiation missile is being developed to arm the Sukhoi Su-19 'Fencer' variable-geometry attack aircraft. No further information is available.

USSR

AT-5

USSR



Anti-tank missile. In service.

Guidance and Control: Command to line-of-sight guidance

Development and Service

The AT-5 is the latest of Soviet anti-tank missiles and was first seen at the November 1977 Moscow military parade. Five AT-5s are carried in canisters on a rotating launcher by the BRDM-2 vehicle. The

Above: AT-5s carried by BRDM-2 vehicles.

launcher and missiles can be stowed internally when not required. It is thought that the new missile offers improved performance over earlier types, probably including a lower minimum range.

Atoll (AA-2; Soviet designation K-13A) and Advanced Atoll

USSR

Air-to-air missiles. In service.

Data: Atoll

Powered by: Solid-propellant rocket motor

Airframe: Cylindrical body. Cruciform triangular control surfaces near nose, indexed in line with fixed cruciform tail-fins

Guidance and Control: Infra-red homing guidance. Control by cruciform foreplanes and small gyroscopically-controlled tab at tip of trailing-edge of each tail-fin

Warhead: High-explosive

Length: 9ft 2in (2.80m)

Body diameter: 4.72in (0.12m)

Fin span: 1ft 8.75in (0.53m)

Span of control surfaces: 1ft 5.75in (0.45m)

Cruising speed: Mach 2.5

Range: approx 3-4 miles (5-6.5km)

Development and Service

Soviet counterpart of the American Sidewinder and similar in configuration, size and guidance system. 'Atoll' is standard armament on Soviet Air Force and export versions of the MiG-21. It has also been produced in India to equip the MiG-21s of the Indian Air Force. Performance and capability are likely to be comparable with those of Sidewinder.

The latest multi-role versions of the MiG-21 carry four missiles on underwing pylons instead of the two 'Atolls' on earlier versions. The two additional weapons have radar homing guidance and are known at present as 'Advanced Atolls' to distinguish them from the original infra-red type.

Below: 'Atoll' under the wings of a MiG-21MF 'Fishbed-J'.



Bantam (RB53)

Sweden



Above: Bantam leaving its ground launcher.

Right: Bantam launch containers on a Puch-Haflinger jeep.



Light anti-tank missile. In production and service.

Prime contractor: Aktiebolaget Bofors

Powered by: Two-stage solid-propellant rocket motor

Airframe: Cylindrical body, with rounded ogival nose and rear-mounted cruciform wings, made largely of glassfibre-reinforced plastics. Vibrating spoilers in trailing-edges of wings, which unfold as missile leaves container-launcher

Guidance and Control: Wire guidance via operator's joystick control. Missile is spin-stabilised by bent-over rear corners of wings. Control by vibrating spoilers

Warhead: Hollow charge, weighing 4.1lb (1.9kg)

Length: 2ft 9.5in (0.85m)

Body diameter: 4.3in (0.11m)

Wing span: 1ft 3.75in (0.40m)

Launch weight: 16.5lb (7.6kg)

Cruising speed: 190mph (306km/h)

Range limits: 985-6,600ft (300-2,000m)

Development and Service

Work on this very small wire-guided anti-tank missile was started as a private venture in 1956, with the aim of producing a weapon for operation by a single infantryman. Twelve can be carried in a state of instant readiness by the Puch-Haflinger light cross-country vehicle, each complete with a carrying rack in case they are needed for infantry use in combat areas. Bantams have also been launched successfully from light combat aircraft such as the Saab Supporter, and from helicopters.

Weight of the complete Bantam weapon system, including launcher, carrying rack, cable and control unit, is 44lb (20kg). Time required to set up the missile and fire it is about 25 seconds. Hit probability is claimed to be 95-98% over ranges between 2,625 and 6,600ft (800-2,000m). Contracts from the Swedish and Swiss Armies maintain production.

Bantams have also been ordered to arm Scottish Aviation Bulldogs (SK 61s) of the Swedish Air Force.

Bloodhound Mk 2 (Swedish Air Force designation RB68)

UK

Surface-to-air missile. In service.

Prime contractor: British Aerospace Dynamics Group

Powered by: Two Rolls-Royce Bristol Thor ramjet engines. Four jettisonable Bristol Aerojet solid-propellant boosters

Airframe: Cylindrical metal body with pointed ogival nose-cone. Pivoted mid-set wings, mid-way back on body and indexed in line with fixed horizontal tail surfaces. Ramjet engines carried on pylons above and below rear part of body. Equi-

spaced wrap-round boosters, each with large stabilising fin

Guidance and Control: Semi-active radar homing, using Ferranti Firelight or GEC/AEI Scorpion target illuminating radar. Twist-and-steer control by means of wings, which can pivot both differentially and together

Warhead: High-explosive, with proximity fuse

Max length: 27ft 9in (8.46m)

Max body diameter: 1ft 9.5in (0.546m)

Wing span: 9ft 3.5in (2.83m)

Range: over 50 miles (80km)



Development and Service

Bloodhound was developed originally by The Bristol Aeroplane Co Ltd, under the code-name Red Duster, as the standard RAF home defence missile. The original Mk 1 version became the first British weapon in this category to enter service, in mid-1958. It was replaced subsequently by the Mk 2, as described above, with more powerful Thor ramjets and boosters, CW (continuous wave) radar guidance, longer range, greater lethality and improved effectiveness at low altitudes. Tests showed that Bloodhound 2 could destroy fast targets at heights below 1,000ft (300m). Its air transportability was

Blowpipe

Shoulder-fired close-range surface-to-air missile. In production and service.

Prime contractor: Short Brothers Ltd

Powered by: Two-stage solid-propellant rocket motor. First stage ejects missile from container. Second stage ignites after missile has coasted safe distance from operator

Airframe: Slim cylindrical body with long ogival nose-cone. Cruciform delta-shape control surfaces on nose, and cruciform delta tail-fins mounted on a sliding ring which locks into position at launch

Guidance and Control: Radio command guidance. Control by means of foreplanes

Warhead: High-explosive, with proximity fuse

Length: 4ft 5.1in (1.35m)

Body diameter: 3in (76mm)

Fin span: 10.8in (0.274m)

Weight of complete system, with missile: 42.75lb (19.4kg), or 46.75lb (21.2kg) with IFF

Development and Service

Shorts initiated development of Blowpipe as a private venture, using a similar command link guidance system to that which had proved so



Above left: Bloodhound 2s.

Above: Bloodhound 2 during booster separation

such that it could be used to reinforce overseas commands and, in fact, the missile was deployed by the RAF in Malaysia from the autumn of 1964. When British forces left the area, these weapons were taken over by the Singapore Air Defence Command. Other operators of Bloodhound 2 are Sweden and Switzerland.

RAF Strike Command continues to deploy Bloodhound Mk 2 in the UK.

UK



successful with Seacat and Tigercat. Small enough to be carried by a paratroop, fired from the shoulder and air-dropped in a multi-round pack, the weapon system consists only of the missile itself in a transport/launch container and an aiming unit attached to the container. All equipment is packed into the aiming unit, including the monocular sight and thumb-operated joy-stick by which the Blowpipe missile is guided to the target. Acquisition of the target and firing can be as little as four seconds. As the missile leaves the end of the container, the tail-fin assembly housed in the front of the tube slides along the missile body and locks into place. This

Bullpup A (AGM-12B/E)

Air-to-surface tactical missile. In service.

Prime contractors: Martin Marietta Corporation/Maxson Electronics Corporation/Kongsberg Vaapenfabrikk

Powered by: Thiokol LR58-2 storable liquid-propellant rocket motor, of 12,000lb (5,440kg) st

Airframe: Cylindrical body with pointed ogival nose and tapered tail. Rear-mounted cruciform wings indexed in line with cruciform delta control surfaces on nose-cone

Guidance and Control: Radio command guidance. Control by foreplanes

Warhead: High-explosive, weighing 250lb (113kg). Fragmentation in AGM-12E

Length: 10ft 6in (3.20m)

Body diameter: 1ft 0in (0.305m)

Wing span: 3ft 1.5in (0.95m)

Launch weight: 569lb (258kg)

Cruising speed: Mach 1.8

Max range: 7 miles (11km)

Development and Service

Bullpup was conceived originally, under the US Navy designation ASM-N-7, as a simple weapon built around a standard 250lb bomb and powered by a solid-propellant motor developed by the Navy. The pilot of the launch aircraft steered it in flight by

enables the diameter of the main part of the container to be kept to a minimum.

Blowpipe can be used against both attacking and receding aircraft and is the only weapon of its kind which is effective in the forward quadrants. A fully integrated identification (IFF) system is an optional extra. It also has a surface-to-surface capability against light armoured vehicles and inshore craft. The missile is currently in service with British and Canadian armed forces and other undisclosed countries. A naval application is in the Vickers Ship Building Group's SLAM submarine-launched missile system (qv).

USA

movements of a hand switch in the cockpit, using tracking flares above and below the rocket nozzle as a reference in order to keep Bullpup on a line-of-sight path to the target. This original version became operational on 25 April 1959, and was later redesignated AGM-12A. It was superseded by the AGM-12B (formerly ASM-N-7A) for the US Navy, with storable liquid-propellant engine, improved warhead and extended range control; and the USAF AGM-12B (GAM-83A) with a modified guidance system which permitted pilots to make their attacks from an offset position in relation to the target.

Production was undertaken initially by Martin Marietta, who had developed Bullpup A from design study to flight test in under two years. Maxson was brought in as second-source supplier to meet demands for the weapon and eventually took over all US Bullpup production. Licence manufacture in Europe was handled by a consortium led by AS Kongsberg Vaapenfabrikk of Norway, for the armed services of Denmark, Norway, Turkey and the UK. Aircraft armed with Bullpup have included the US Navy's A-4, A-5, A-6, A-7, F-8E and P-3B; the USAF's F-4, F-100 and F-105, and the Royal Navy's Buccaneer.

The final version of Bullpup, produced on a limited basis by Martin Marietta for the USAF, was the AGM-12E with an anti-personnel warhead for use in Vietnam.



Bullpup B (AGM-12C/D)

Air-to-surface tactical missile. In service.

Data: AGM-12C
Prime contractor: Martin Marietta Corporation/Maxson Electronics Corporation
Powered by: Thiokol LR62 storable liquid-propellant rocket motor
Airframe: Basically cylindrical body, tapering towards nose and tail. Pointed ogival nose-cone, with cruciform delta control surfaces, mounted on front of body. Rear-mounted cruciform wings indexed in line with foreplanes
Guidance and Control: Radio command guidance. Control by foreplanes
Warhead: High-explosive (AGM-12C), or alternative high-explosive or nuclear (AGM-12D)
Length: 13ft 4.25in (4.07m)
Body diameter: 1ft 5.25in (0.44m)
Wing span: 3ft 10.5in (1.18m)
Launch weight: 1,790lb (812kg)
Range: 10 miles (16.5km)

Development and Service

Bullpup A proved such an effective weapon that the US Navy sponsored the development of a version with much extended capabilities, built around a 1,000lb (454kg) high-explosive warhead. Known as Bullpup B, this went into production for the Navy under the designation ASM-N-7B, changed after a time to AGM-12C, and augmented rather than replaced Bullpup A. The USAF acquired a version designated AGM-12D (originally GAM-83B), with interchangeable nuclear and high-explosive warheads.

Right: Bullpup B.



USA

Carcara

Air-to-surface missile. Under development

Prime contractor: Avibras-Industria Aeroespacial
Guidance: Television guided

Chaparral (MIM-72A)

Surface-to-air weapon system. In production and service.

Prime contractor: Ford Aerospace and Communications Corporation, Aeronutronic Division
Guidance and Control: Infra-red homing guidance. Control by cruciform foreplanes
Length: 9ft 6in (2.90m)

Development and Service

Carcara was reported to be under development for the Brazilian Army. It is not known if the project is continuing or whether it has already been abandoned.

Body diameter: 5in (0.13m)
Span of tail-fins: 2ft 0in (0.61m)
Launch weight: 190lb (86kg)

Development and Service

Chaparral is a close-range battlefield weapon system which uses Sidewinder 1C missiles modified for a surface-to-air role. Four Sidewinders are mounted in ready-to-fire condition on a fire unit which is

Brazil

USA



normally installed on an M730 self-propelled tracked vehicle; alternatively the fire unit can be trailer-mounted or dismounted for use from a semi-mobile emplacement (system designation is M48 Guided Missile System, Intercept, Aerial). Initial aiming is done by a gunner in the fire unit turret mount, who keeps an optical sight aligned on target. After launch, the missile's own infra-red homing system takes over.

Development of Chaparral began in the spring of 1965. Test firings from prototype fire units started in July of that year and production was initiated in 1966 for the US Army's then-new air defence battalions, each of which has two batteries of Chaparrals and two of Vulcan multi-barrel 20mm guns. The five-man crew of an M48 has rations and equipment for at least three days of autonomous operations and can travel at up to 40mph (64km/h) on roads. Only one man is required to fire the missiles, of which 12 are carried; the others keep watch for hostile aircraft.

The first phase of a phased improvement programme consisted of upgrading the missile by addition of a new guidance unit, fuse and warhead to provide a much greater capability. These missile improvements entered production in 1975.

In 1978 five successful test firings of Chaparral missiles guided by radar were undertaken against an MQM-107 target drone and a drone helicopter. The tests demonstrated that the missile, with an

additional command guidance module, can be accurately guided by a tracking radar to give the Chaparral system night and adverse weather capability.

Above: Chaparral mounted on an M730 tracked vehicle.

Below: Chaparral air-defence missile system.



Chinese anti-ship missile

A new Chinese anti-ship missile has become operational on Hai Dua class boats, the first of which was built in 1976.

Chinese ICBMs (CSS-3 and CSS-X-4)

Land-based intercontinental ballistic missiles.

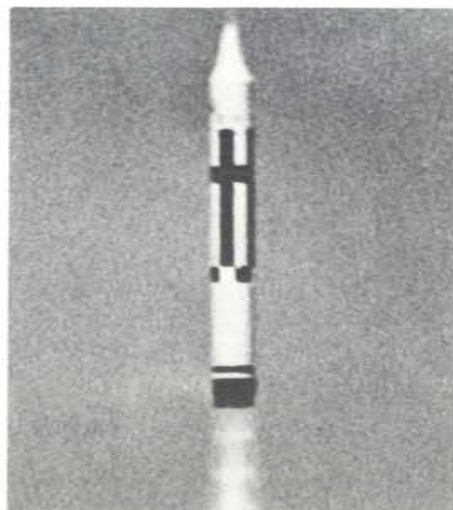
Warhead: Nuclear

Development and Service

There are two Chinese ICBMs. The CSS-3 limited-range ICBM was flown under test conditions in 1976 and only a small number are expected to be deployed. The long-range CSS-X-4 ICBM is under development and could be deployed during the first half of the 1980s.

China achieved its first successful firing of an ICBM in late 1970. The range of the missile, which carried an inert warhead, was restricted deliberately to 2,000 miles (3,200km), so that the test could be confined within the nation's own borders. Further flight tests took place in 1973.

The CSS-3 is thought to have a range of about 3,500 miles (5,630km). This makes it capable of reaching well into the Soviet Union, but only to western Alaska in the USA. The CSS-X-4 long-range ICBM is still being developed, and has been used successfully as a satellite launch vehicle. Assuming a range of 7,456 miles (12,000km), it will be capable of reaching major cities in the USA and could have a megaton yield warhead.



Above: Launch of a Chinese ICBM.

Chinese IRBM (CSS-2)

Intermediate-range ballistic missile. In service.

Powered by: Single-stage liquid-propellant motor

Warhead: Nuclear

Range: approx 1,555-2,485 miles (2,500-4,000km)

Development and Service

Chinese CSS-2 ICBMs have been deployed operationally since 1971. It is thought that between 20 and 30 are operational. CSS-2s are capable of reaching targets in central and eastern Asia.

Chinese MRBM (CSS-1)

Medium-range ballistic missile. In production and service.

Powered by: Single-stage liquid-propellant motor

Warhead: Nuclear

Range: approx 685-1,118 miles (1,100-1,800km)

Development and Service

US Secretary of Defense Melvin R. Laird said in February 1970 that China was expected to deploy its first medium-range ballistic missiles (MRBMs) 'at any time' and that 80-100 of the weapons would probably be operational by the mid-1970s. Deployment may have been a little slower than

China

China

China

China

expected, as reports suggest that only 50 operational CSS-1 MRBMs and a smaller number of IRBMs were available for use, in about four launch areas, by 1974. The latter are generally soft sites, above ground, but some missiles are reported to be stored in silos and caves. The warheads for long range rockets have been under development since the first Chinese explosion of a 20-kiloton nuclear device at Lop Nor in the Sinkiang desert on 16 October 1964.

The fourth such test, in October 1966, was claimed to involve delivery of the warhead to a target area by a missile — thought to have been based on a Soviet weapon like 'Sandal'. The MRBM is probably similar. It was described by General George S. Brown, Chairman of the US Joint Chiefs of Staff, in 1976, as 'based on the Soviet SS-2, obsolescent, cumbersome, with slow reaction time'.

Chinese SLBM

Submarine-launched ballistic missile. Under development.

Development and Service

Reports have suggested that China is developing a two-stage solid-propellant SLBM in approximately

the same class as the early Polaris. A purpose-built nuclear submarine is also likely to be under development to supplement China's single Soviet 'Golf' class ballistic missile submarine, which has three vertical missile tubes but may not be armed with missiles at present.

Chinese surface-to-air missile

Development and Service

The Chinese frigate *Kiangtung*, built in 1977, carries close-range surface-to-air missiles of similar size to the Soviet 'Goa'. It is unknown whether this is a newly designed missile or not.

Cobra 2000 (B0810)



Germany